



Installation manual

APP 541





This manual is applicable to the following APP 541 versions:

Hardware:

Operator panel: AFH1801 Rev 1.02

I/O-module: AHH1801 Rev 1.02

Com-module: TMX1801 Rev 1.00

System Software: 2.20

Application: 1.00

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This document may be changed without any prior notice.

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1. Read this first

Before starting installation of the APP 541 read this chapter carefully. It contains general information on documentation, safety and guarantee.

1.1. Product documentation

Documentation delivered with the APP 541. Check that this manual version is applicable to the delivered APP 541 version (see cover inlet).

1.2. Safety rules for the owner/operator

- All government regulations, local health and safety directives must be observed.
- All danger due to electricity must be avoided.

1.3. Guarantee

- Modifications or changes to the unit/installation should be done only after consulting ITT Flygt.
- Genuine spare parts and accessories authorized by the manufacturer are essential for compliance with the terms of the guarantee. The use of other parts may invalidate the guarantee.

1.4. This manual

In order to avoid repetition of information, this manual describes how one pump P1, should be read or entered. If a second pump or more pumps, are included in the installation, the corresponding steps must be repeated on those too.

1.4.1. Symbols used



Safety instruction

Risk of personal damage.



Safety instruction

Risk of personal damage - dangerous voltage.



Special attention value

Risk of apparatus or component damage.

1.4.2. Abbreviations

CS = Central system

RTU = Remote Terminal Unit

SCADA = Supervision Control And Data Acquisition

2. Introduction

The APP 541 is a pump controller that consists of two parts, i.e. a DIN rail-mounted I/O module and a operator panel.

The APP 541 can use a modem, GSM or radio to communicate with a SCADA system e.g. the AquaView. A special communication module is available for this purpose.

Observe all precautions for handling electrostatically sensitive devices before opening the unit.



The front surface of the APP 541 has a high degree of protection against moisture and dirt, but should always be installed so that it will not be unnecessarily exposed to water or the risk of external physical damage.



The APP 541 may be used only in the manner specified by the manufacturer.

The manufacturer does not allow any internal modifications to be made in the unit.

Always keep this manual in the vicinity of the installed unit.

3. Mechanical installation

3.1. Installation in explosive areas

The unit must never be installed in an explosive or flammable environment.



For instructions concerning installation of the level sensors in such an environment see section 3.2. Level sensor installation.

If the pump is installed in an explosive environment, its thermal overload switch must be connected

3.1.1. Installation in an equipment cubicle

Ensure that the operating temperature of the cubicle is between 0 and 50° C. Heating will normally be required in winter if the cubicle is located outdoors or in a similarly cold environment.

The cubicle temperature may become too high in summer if ventilation is inadequate. Heating of the cubicle is also recommended to avoid condensation.

3.2. Level sensor installation

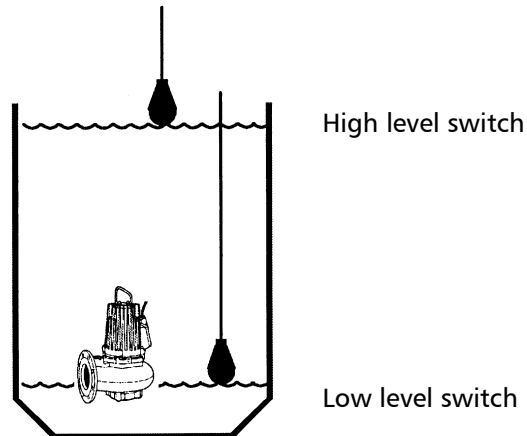
N.B. See separate operation and installation manual for details of installation in the pump sump.

3.2.1. 4-20 mA level sensor

The sensor shield must be connected to the earth (ground) terminal of the APP 541 as shown in the diagram under “Analogue input” on page 9.

The sensor may be installed in an explosive or flammable environment, provided that an external Ex barrier is used.

3.2.2. ENM-10 level regulator



Installation of the ENM-10 level regulator in the pump sump.

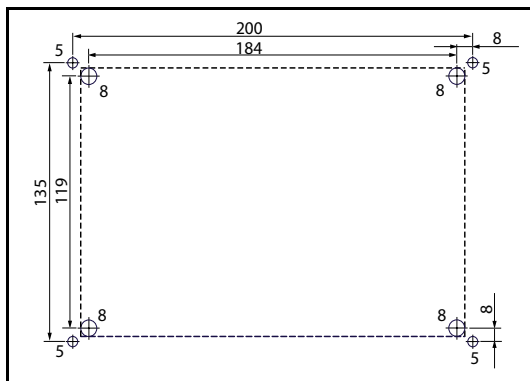
ENM-10 level regulators may be installed in an explosive or flammable environment, provided that an intrinsically safe Ex barrier is used.

3.3. Mounting instructions

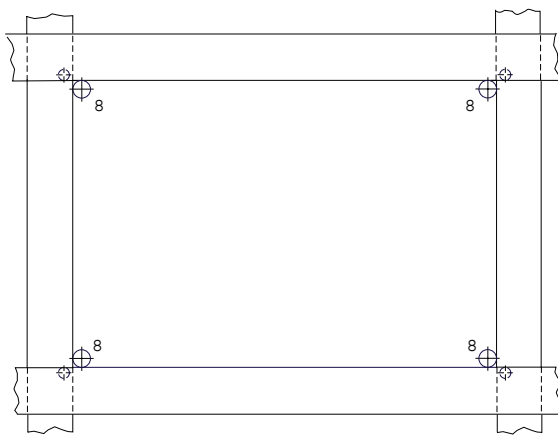
The enclosure is designed for mounting into a rectangular hole in a larger cabinet door.

A rubber gasket will seal against the front surface of the cabinet door. Studs welded to the rear of the front plate must enter into holes in the cabinet door.

- Use the paper template to mark off the opening to be made in the cubicle door.
- Tape the template to the cubicle door. Mark with a centre-punch the positions of holes **5** and **8** in the template.
- First drill a small pilot hole at every punch mark. Then open up the screw holes marked **5** in the template to 5 mm.
- Drill 8 mm dia. holes marked **8** in the template for the corners of the opening in the cabinet door.



- Then tape with masking tape between the outsides of the holes **8**. See the drawing.



- Use a jigsaw or some other suitable tool to make the opening for the operator panel in the cubicle door.
- Place the operator panel in the opening. Fit the washers and nuts, and tighten them firmly.

3.3.1. Notice about mounting front seal according to IP 65



Be careful not to get any grease in your eyes and avoid prolonged skin contact. Wash your hands afterwards.

To assure a front seal according to IP 65 the front unit has to be mounted on to a rigid and smooth surface.

If otherwise mounted on to a textured surface and/or flexible steel plate cabinet, it is normally necessary to apply a thick layer of grease on the sealing surfaces to obtain sealing according to IP 65.

Suitable grease is "Gleitmo 1810v". After application wipe gently all overflowing grease away.



Do never use grease containing silicone since this might seriously damage sensitive electric contact surfaces inside the cabinet!

3.3.2. I/O-module

The I/O-module has clamps at the rear.

- Place the unit in a suitable location on a DIN rail.
- Connect the cables supplied between the operator panel and the I/O-module. Secure the cable so that they will not be nipped.

Note: The Ethernet cable is a crossover UTP RJ 45 cat 5e. The cable length is 1.8 m (max length 3 m).

4. Electrical installation

Warning



Do not open machine with the grounding wire disconnected.

More than one live circuit.



The electric wiring should be done only by an authorized electrician. All electrical installation work must be carried out with the equipment disconnected from the power supply, without any possibility of being made live, and in accordance with local regulations.



An ON / OFF isolating switch must be provided adjacent to the installation to enable the APP 541 to be isolated from the power supply. This isolating switch must be located close to the APP 541 and must be easily accessible to the user.

The isolating switch should be marked to show that it belongs to the APP 541.

When installing electronic measuring and control systems, it is important that the cabling be specified and run so as to minimize interference by electric and magnetic fields.

The many potential sources of such interference include relay coils, solenoid valves, switches, thyristor units, earth (ground) currents and static electrical discharges.

Susceptibility to interference also varies with the electrical environment, i.e. due to factors such as cable lengths, screening and whether or not interference suppression is provided. Many problems can be prevented by good design.

Cables carrying signals of different types (for example, analogue and digital signals) must be run separately. Power and signal cables must never be run in close proximity to one another.

4.1. Power supply

A separate fuse must protect the APP 541 power supply. Flygt recommends the use of a miniature circuit breaker that opens on all poles.

One I/O module is designed to operate on 100 to 240 V AC power supply.

The unit can also operate on 24 V DC as backup power supply and can charge the backup battery when the mains power supply is on.

And there is one model designed to operate at 24 v DC.

The I/O module also supplies power to the operator panel.

N:B. Max. current available to the modem:

24 VDC, 180 mA, 4.5 Watt

4.1.1. Earthing (grounding)

An equipment earthing (grounding) conductor must be connected to terminal 3 (see Wiring diagram).

The earthing conductor should be connected to the best possible earth, such as an earthed mounting plate or an earth rod. Remember that the earthing conductor must be as short as possible.

The shields of all shielded cables must be earthed.

4.1.2. Overvoltage protection

Flygt recommends that the mains power supply unit be provided with overvoltage protection (with lightning protection). Since this will make the APP 541 less sensitive to overvoltage, it will enable it to be used in more severe environments.

The protection should be connected in series with the power supply, preferably to a separate earth (ground), such as an earth rod, although connection to the earth busbar in the distribution box may sometimes suffice.

A 6-10 mm² earthing wire should be used to connect the overvoltage protection to earth.

4.2. Emergency operation

When the control unit is in the normal running mode a relay (1) will be activated. If the control unit should fail, due to software, hardware or power supply fault, the relay will be deactivated (0).

This relay can be connected between a high level switch, a timer and a power supply relay controlling the pump. This function will provide an emergency function that will run the station on the high-level switch even if the control unit is out of operation.

- Emergency operation is delayed by 5 seconds after the supply has been switched on.
- External Manual-0-Auto switch is located close to the operator panel.

4.3. Connections

The terminal blocks on the APP 541 are described below and are shown in the "Wiring diagram 100-240 V AC" on page 11.

4.3.1. Digital inputs

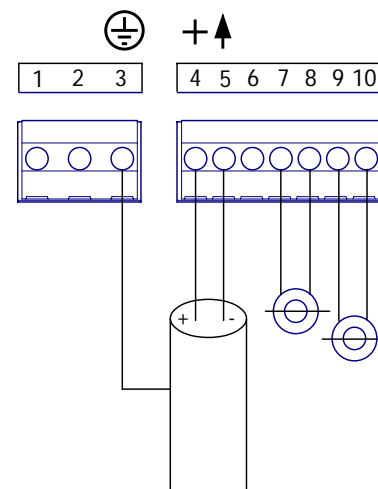
The digital inputs are connected to terminals 28 -59 (see the "Wiring diagram 100-240 V AC" on page 11). Each input has its own power supply.

4.3.2. Inversion of inputs

The digital input signals can be inverted to change the operating mode from closing to opening, or vice versa. 0 indicates no inversion. This is the default state. See the **User manual**.

4.3.3. Analogue input

The analogue input (4-20 mA) is connected to terminals 4 - 5 (see the Wiring diagram) and has its own power supply. The input can carry a maximum total voltage of 16 V.



Analogue terminals for:

- | | |
|------|--|
| 3 | Shield |
| 4 | Red + |
| 5 | Black - |
| 7-8 | Input for current transformer with 0-1 A AC output |
| 9-10 | Input for current transformer with 0-1 A AC output |

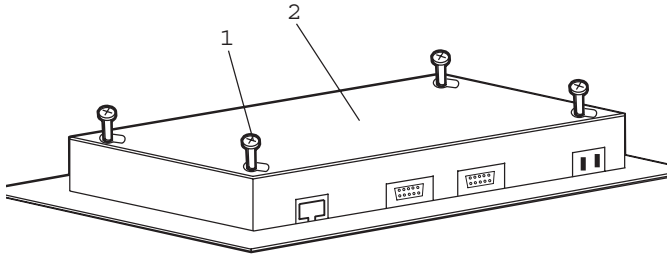
4.3.4. Digital outputs

The digital outputs are connected to terminals 11-22 (see the Wiring diagram). The outputs are potential-free, relays with a max. rating of 2 A at 230 V AC or 30 V DC.

4.4. Communication

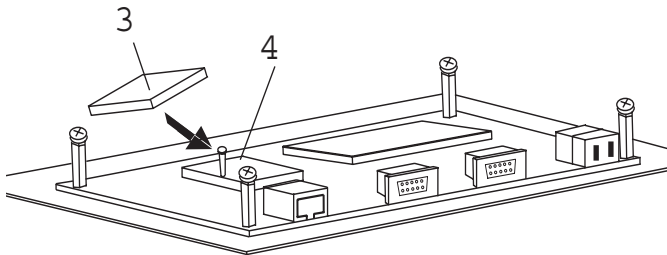
To install the communication module, in the operator panel, follow the instructions below:

N:B: Make sure that the power supply is isolated!



1. Release the four screws (1) holding the rear cover to the front of the unit.
2. Lift off the rear cover (2).

Unpack the communication module (3).



3. Place module (3) in the position (4), (see above).
4. Make sure it is securely in position.
5. Refit the rear cover.

4.4.1. Connection to a modem or radio

Connect the enclosed dedicated modem cable from the modem/radio to the RS232 connector on the COM1.
Connect the modem/radio to its own power supply.

4.4.2. Connection to a PC using a fixed line

Connect a dedicated null-modem cable from the PC to the RS232 connector on the COM1.

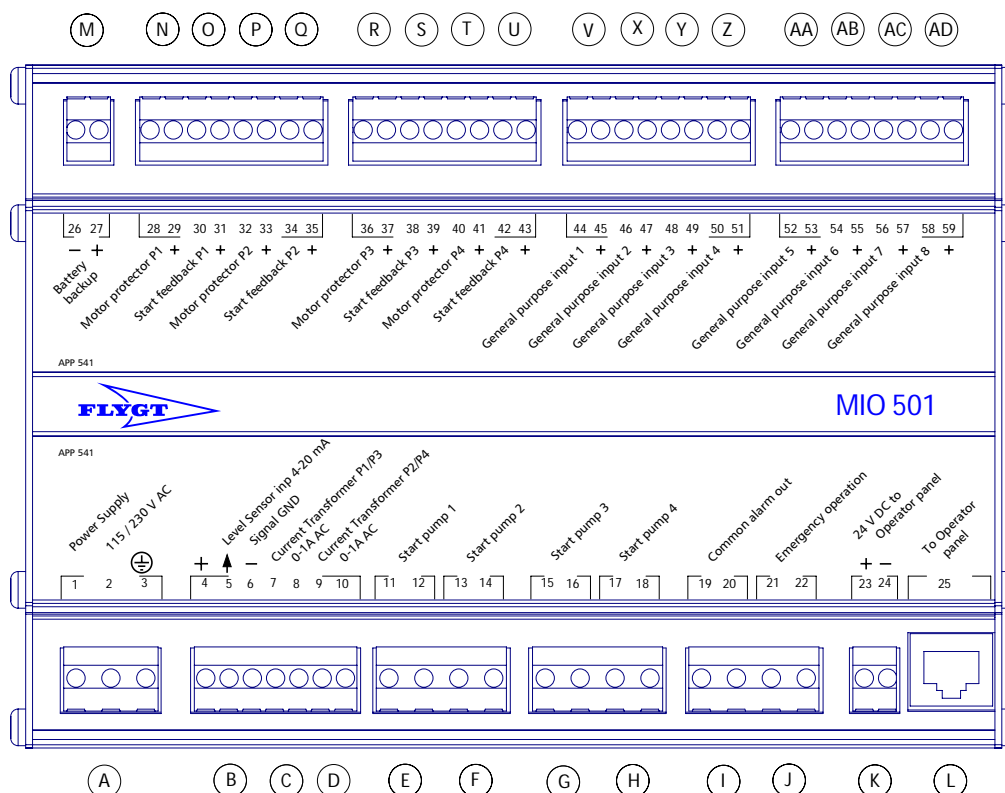
N.B. A common misunderstanding is to confuse the use of a modem cable and a null-modem cable. Normally a modem cable has a male contact in one end and female contact in the opposite end. The null-modem cable has normally female contacts in both ends.

Note that they are different connected internally to the contact pins. Be sure to use the right cable for each purpose.

N.B. For configuration, see the User manual.

5. Wiring diagram 100-240 V AC

- Power supply** (see section 4.1):
- A Power supply, phase, neutral and ground: 100-240V AC, 50/60 Hz. (1, 2, 3)
- Analogue inputs** (see section 4.3.3):
- B Level sensor input, 4-20 mA. (4, 5, 6)
- C Current transformer for pump 1/3, 0-1 A AC (7, 8)
- D Current transformer for pump 2/4, 0-1 A AC (9, 10)
- Digital outputs** (see section 4.3.4):
- E Start pump 1 (11, 12)
- F Start pump 2 (13, 14)
- G Start pump 3 (15, 16)
- H Start pump 4 (17, 18)
- I Common alarm output (19, 20)
- J Emergency operation (21, 22)
- Operator panel** (see section 3.3.1):
- K Operator panel 24 V DC (23, 24)
- L Communication to operator panel (25)
- Power supply** (see section 4.1):
- M Battery backup 24 V DC (Option) (26, 27)
- Digital inputs** (see section 4.3.1):
- N Motor protector to pump 1. (28, 29). If not used, jumper the input.
- O Start-feedback from pump 1. (30, 31)
- P Motor protector to pump 2. (32, 33)
- Q Start feedback from pump 2. (34, 35)
- R Motor protector to pump 3. (36, 37)..
- S Start feedback from pump 3. (38, 39)
- T Motor protector to pump 4. (40, 41)
- U Start feedback from pump 4. (42, 43)
- V General purpose input 1. (44, 45)
- X General purpose input 2. (46, 47)
- Y General purpose input 3. (48, 49)
- Z General purpose input 4. (50, 51)
- AA General purpose input 5. (52, 53)
- AB General purpose input 6. (54, 55)
- AC General purpose input 7. (56, 57)
- AD General purpose input 8. (58, 59)



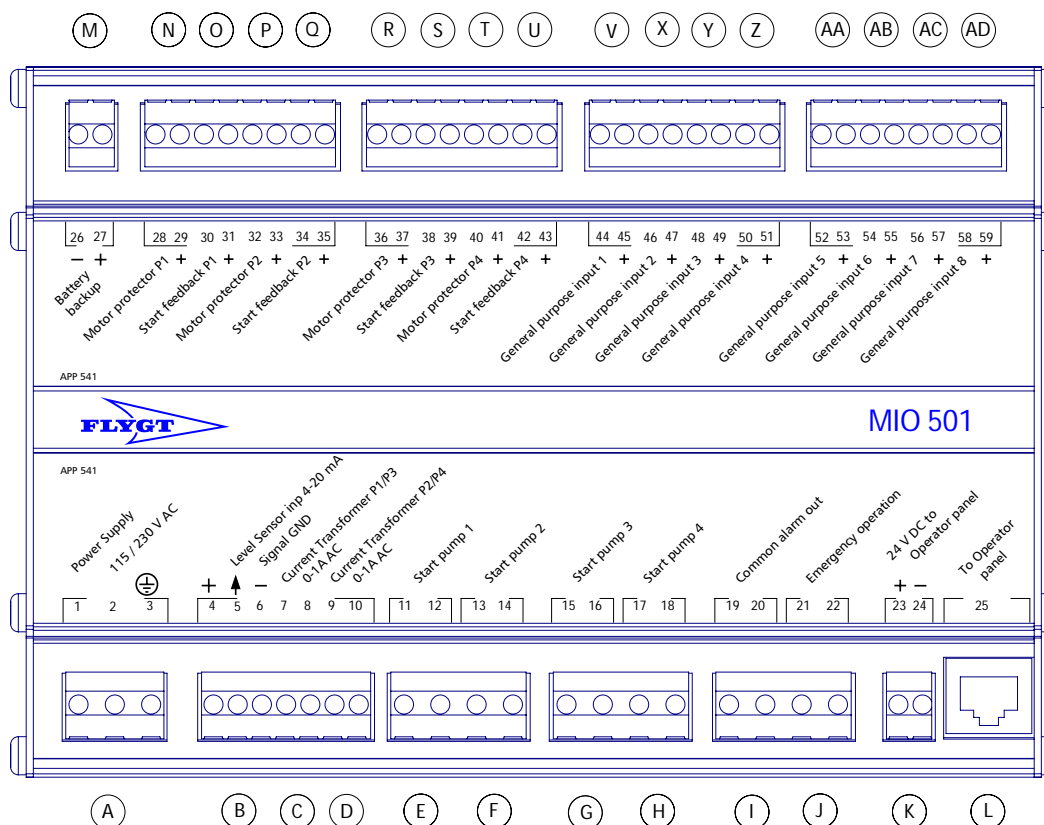
N.B. Terminals 6, 8 and 10 are connected together internally.

N.B. Terminals 29, 31, 33.....59 are connected together internally.

N.B. I and J are activated at normal operation.

Wiring diagram 24 V DC

- A Ground (3)
- Analogue inputs (see section 4.3.3):**
- B Level sensor input, 4-20 mA. (4, 5, 6)
- C Current transformer for pump 1/3, 0-1 A AC (7, 8)
- D Current transformer for pump 2/4, 0-1 A AC (9, 10)
- Digital outputs (see section 4.3.4):**
- E Start pump 1 (11, 12)
- F Start pump 2 (13, 14)
- G Start pump 3 (15, 16)
- H Start pump 4 (17, 18)
- I Common alarm output (19, 20)
- J Emergency operation (21, 22)
- Operator panel (see section 3.3.1):**
- K Operator panel 24 V DC (23, 24)
- L Communication to operator panel (25)
- Power supply (see section 4.1):**
- M Power supply 24 V DC input or
Battery backup 24 V DC (Option) (26, 27)
- Digital inputs (see section 4.3.1):**
- N Motor protector to pump 1. (28, 29)
- O Start-feedback from pump 1 (30, 31)
- P Motor protector to pump 2. (32, 33)
- Q Start feedback from pump 2. (34, 35)
- R Motor protector to pump 3. (36, 37).
- S Start feedback from pump 3. (38, 39)
- T Motor protector to pump 4 (40, 41)
- U Start feedback from pump 4. (42, 43)
- V General purpose input 1. (44, 45)
- X General purpose input 2. (46, 47)
- Y General purpose input 3. (48, 49)
- Z General purpose input 4. (50, 51)
- AA General purpose input 5. (52, 53)
- AB General purpose input 6. (54, 55)
- AC General purpose input 7. (56, 57)
- AD General purpose input 8. (58, 59)

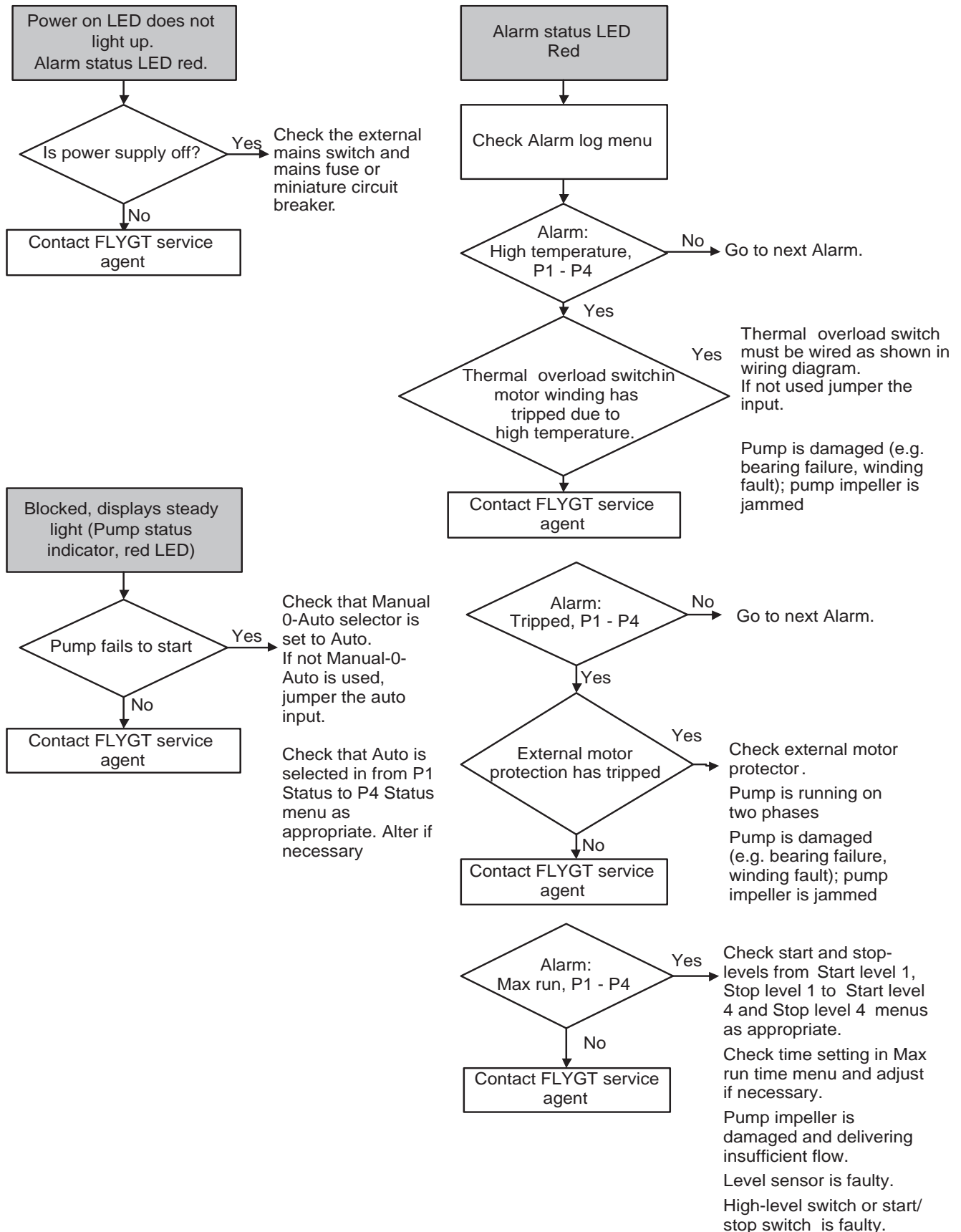


N.B. Terminals 6, 8 and 10 are connected together internally.

N.B. Terminals 29, 31, 33.....59 are connected together internally.

N.B. I and J are activated at normal operation.

6. Fault tracing



7. Specification

Digital inputs	Total of 16: Pump fault, circuit tripped, start feedback, high level switch, thermal overload switch, external Manual-0-Auto switch, external alarm, general purpose
Relay outputs	Total of 6: Start pump, common alarm, emergency operation.
Analogue inputs	Total of 3: Analogue level, 4–20 mA, analogue current CT 0-1 A AC
Processor	16-bits Motorola HCS12
Battery back-up for the real time clock	3 V Lithium, Battery will normally last for 8 years.
Current consumption	< 50 mA
Fuses	100/240 V AC: T3. 15 A 24 V DC: 1.1A
Rated voltage	100-240 V AC 50/60 Hz or 24 V DC (18 - 36 V DC)
Relay output	Max. load 240 V AC/2 A
Rated output for modem	24V DC 180mA (when RTU is powered with 100/240 V AC).
Operating temperature	Operating temperature -20° C to + 50° C. The LCD display will respond more slowly at temperatures below 0° C
Storage temperature	-10° C to + 70° C
Humidity (non-condensing)	90 % RH
Degree of protection	IP 65 Front, IP 20
EMC emission standard	EN 61000-6-3
EMC immunity standard	EN 61000-6-2
LVD electrical safety	EN 61010-1
Display	LCD 2 x20 character
Push buttons	8
Indications	12 LEDs
Dimensions control pane (l × w × h)	220 x 150 x 25 mm
Dimensions I/O-module (l × w × h)	210 x 149 x 47 mm
Weight of operator panel	1 kg
Weight of I/O-module	0.9 kg
Mounting	Cabinet
Terminals	Signal: 1.5 mm ² Power: 2.5 mm ²
Cable from I/O unit to operator panel	Ethernet cable is a crossover UTP RJ 45 cat 5e. The cable length is 1.8 m (max length 3 m).
Level sensor types	External level sensor 4-20 mA External level regulator ENM-10



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